**Class Notes: Matter, Properties, Reactions**

**Substance:** matter that has uniform (smooth) and definite (particular) composition (make-up)

--made only of certain things with no impurities **(Pure substance)**

**2 Kinds:**

1. **Element:** simplest form of matter that has unique set of properties (all atoms are identical, building material for all matter)

**--Symbol:** every element has a symbol

1 or 2 letters, first letter capitalized, second letter lowercase

1. **Compound:** contains one (or more) elements **chemically** combined in a fixed proportion (amounts never change)

(atoms stuck together to make new substances, can always be separated into simpler substances = different elements)

**--Formula:** shows elements in the compound

Shows relative amounts of each element using subscripts

ex. CaCO3, H2O, C6H12O6, NaHCO3, O2, O3

**Equation:** ex. Iron and sulfur, when heated, react to produce iron sulfide

**Reactants:** the substances you start with, on the left of the arrow

**Products:** the new substances (with new properties) that are produced, on the right of the arrow

**Arrow** shows direction of reaction, separates reactants and products

**\*Words:** (above/below) arrow indicate conditions or catalysts that are required for the reaction to proceed

heat

Fe + S FeS

Pt

**Substances have 2 types of properties:**

1. **Physical property:** quality of a substance that can be observed or measured without changing composition

Ex. Color, solubility, odor, melting point, boiling point etc.

**\*Physical change:** some properties change, but the material does not change composition (end with what you start with, reversible)

1. **Chemical property:** ability of a substance to undergo a specific chemical change (can change to form new substance, only determined by changing substance)

Ex. Combustion, oxidation, rusting, rotting food

**\*Chemical change:** change that produces matter with a different composition than the original matter (end with something different than started with, difficult to reverse)

**Chemical reaction = Chemical change**

one or more substances change into one or more new substances (atoms are rearranged, new substances with new properties formed, heat is usually produced or absorbed)

**Phase:** any part of a sample with uniform composition and properties

**Some substances are Mixtures:** a **physical** blend (mixture) of two or more substances that remain distinct and their composition (make-up) stays the same (Not PURE substance)

Ex. Salt water, air, vegetable soup

**2 types of mixtures:**

**1. Heterogeneous:** composition is not uniform (not the same throughout), every sample will be different, there are 2 phases (you can see the differences)

Ex. Chocolate chip ice cream, beach sand, salad dressing

**2. Homogeneous:** composition is uniform throughout = solution

Ex. Air, steel, crude oil, lemonade, sugar water

**\*Mixtures can be separated by physical means\***

**Law of conservation of mass:** in any physical change or chemical reaction, mass is conserved (mass is neither created nor destroyed)

\*\*mass of reactants and mass or products is always equal